# ARTISANAL CANOE FISHING INDUSTRY OF THE RIVERS STATE: ITS ECONOMIC VIABILITY AND INVESTMENT POTENTIALS

by

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## ABSTRACT

Consequent upon the present national call on all and sundry to go back to agriculture including fishing, most retrenched workers and unemployed youths from the riverine areas are taking up fishing as a legitimate and gainful livelihood. To sustain this tempo and attract more investment, the economic viability of such projects must be known. This study is an attempt to document the profitability and investment potential of artisanal canoe fishing.

Socio-economic information including catches, operational cost and returns were obtained through a personal interview questionnaire survey of 240 randomly selected artisanal canoe fishermen from Bonny, Brass and Degema Local Government Areas (LGA) of the State and analyzed.

With an investment cost of about ₦8,135, ₦8,490 and ₦6,571 and operation cost of ₦750, ₦776 and ₦627, the analysis showed an average monthly gross income of ₦1,869, ₦3,221 and ₦1,775 for the three Local Government Areas respectively. A benefit-cost-ratio of 1 : 8, Net Present Value of ₦400,603 and Internal Rate of Return greater than 50% were obtained.

Since capital invested in fisheries is not tied up for long before benefits start flowing, coupled with the high IRR, it is concluded that artisanal canoe fishing would be an economically viable venture if well managed.

## INTRODUCTION

Consequent upon the present national call on all and sundry to go back to farming, fishing and other forms of legitimate and gainful livelihood, people who are situated in the riverine States have re-assessed and regarded fishing as a legitimate and gainful industry. To sustain the tempo of interest that is gaining momentum, we need to demonstrate to the would-be fishermen and financial institutions, the financial and economic viability of the industry. Many studies have been conducted on fisheries economics world-wide including Crutchfield and Zellner, (1962); Bromley, (1969);

Arnold and Bromley, (1970); Gates and Norton, (1974); Bishop, (1975); Abrall, (1975); Craig, (1975); Anderson, (1973); Brander, (1978); Anderson, (1977); Lacker, (1977); Shang, (1978); Kuranchie, (1973); Leinsenmeyer, (1976); Sagua, (1976); Mboma et al, (1981); but few such studies have been conducted on the artisanal fishing industry of the Rivers State, except Fawumi, (1983).

This study is an attempt to ascertain the costs, returns and the profitability of the artisanal fishing industry in the Rivers State. This hopefully would assist would-be fishermen, businessmen, financial institutions and government in their investment decisions regarding artisanal fishing project.

## METHODOLOGY

### The Study Area

The Rivers State is one of the smaller States within the Federation of Nigeria with ten local government areas (LGA) and with an estimated area of 30,000 square kilometers. It is enclosed within the Niger Delta hence, 75% of the area is made up of water and swamplands. The result of this geographical structure, fishing is a main occupation of the riverine people of the State.

Because of lack of precise data, it is not possible to give an accurate picture of the present fishery activities of the State. However, current activities can be grouped under three broad categories; industrial fisheries, artisanal fisheries and fish farming.

The Industrial fisheries consist of inshore and limited distance-water trawling. This sector is so capital intensive that it is dominated by foreign-owned trawlers who operate under charter arrangements with some Nigerian companies. Recently, a few indigenous fishing companies have started exploiting our inshore waters.

On the other hand, the artisanal fisheries sector is labour-intensive and involves almost all riverine people. The sector is composed of four major fisheries:-

(a) Coastal Canoe fishery: which operates from scattered fishing villages along the Atlantic coastline, using large dug-out canoes, some of which are motorized. The popular fishing gear are set nets, drift net and beach seines.

(b) Brackishwater canoe fishery: this includes fishing operations in the creeks and lagoons using smaller canoes than the coastal fishery. The most popular fishing gear of this fishery consist of set nets, cast nets, hooks and traps of various kinds.

(c) Freshwater fishery: operating from the freshwater rivers and the few lakes (artificial and man-made) within the Niger Delta System.

The fishing gear used are similar to those of the brackishwater canoe fishery including spears; and

(d) Flood plain fishery: operating on the flood plains during the rainy season when the major rivers overflow their banks. Popular gear used include spears, fish fence, hooks, set nets, and traps of various kinds.

This study is however, based on the coastal and brackishwater fisheries. The basic operating unit of these fisheries is the indigenous dug-out canoes which are either hand-paddled and often assisted with windsail or motorized with out-board engines. The extent of the coastal canoe fishery is determined by the magnitude of the continental shelf and is limited mainly to the dry season when the locally made dug-out canoes could safely operate out in the sea. Whereas, in the brackishwater fishery, fishing is for all-year-round. Catches from the combined artisanal fisheries are mainly bonga, Ethmolosa spp; croakers, Sciaeniedae; threadfin, Polynemidae; grunters, Pomadasidae; sole, Cynoglossidae; mullets, Mugil spp; catfishes, Ariidae; Chrysichthys sp. and sardines, Sardinella spp.

## Data Collection

A 3-stage random sampling framework was adopted to administer questionnaires to fishermen in three riverine Local Government Areas (LGA), Bonny, Brass and Degema. In each LGA, 6 fishing settlements were randomly selected and 8 fishermen from each settlement were interviewed. On the whole, a total of 30 fishing settlements and 240 artisanal fishermen were randomly selected and interviewed. Also, as much as possible, direct observations were made and direct participation in fishing operations were undertaken in 1985.

## Theoretical Considerations

To facilitate economic analysis, the following concepts were defined as:-

(a) Investment cost: cost of purchasing canoes, gear, outboard engines, buildings and any other capital items owned by the artisanal fishermen.

(b) Operation costs: cost incurred during fishing i.e. cost of fuel, engine oil, gear oil and food expended per fishing trip. Others are regular maintenance and repair of boat engines and gear.

(c) Catches, Yield and revenue: items in these groups include catches per fishing trip, value of catch per trip, prevailing market prices for different fishes, number of fishing trips per month.

(d) Miscellaneous items include the amount of fish consumed at home or used for other purposes than revenue yielding, percentage loss/damage due to spoilage and insect infestation and amount of fish marketed regularly.

It must be cautioned that record keeping is an exception rather than a rule. Hence, the validity of most information obtained from the fishermen were cross-checked in the market as far as possible.

## RESULTS AND DISCUSSION

The results ofthe study are given in Tables 1, 2, 3 and 4. From Table 1, the average investment cost for the LGA are ₦8,135.43, ₦8,490.80 and ₦6,510.55 for Bonny, Brass and Degema respectively. The average investment cost of fishing in the study area is ₦7,712.26. It was also observed that investment cost increases with the use of motorized fishing canoes. For instance, investment cost for a motorized fishing canoe unit is ₦10,702.22, while a non-motorized fishing unit costs ₦3,667.00.

In terms of operational costs, the mean value for the study area is ₦713.50 per month. The values for the LGAs', Bonny, Brass and Degema are ₦739.8, ₦776.2 and ₦626.5 respectively. The monthly operational cost for a motorized fishing unit is ₦1,096.5 whereas for a non-motorized fishing unit it was observed to be ₦166.3. This amount is used mostly for food and other stipends.

Fishermen's catches were given in kilogram in Table 1. Actually, for this study, the local standards of measurement and sales were used to estimate catch and revenues. For instance, in all three LGA's, sales of fish is in fish cards for most fishes (in set of twenty) or by pieces of twenty cut up pieces or whole fish.

The mean catch per trip per fishing unit in the study was observed to be 49.9 kg. However, based on the local units of measurements, the mean catch per canoe per trip ranges for 30 - 50 fish cards during off-season and between 60 - 300 and above during the on-season. Based on selling price of ₦3.50 per card for bonga, ₦2.00 per card for sardines, ₦4.00 for croakers and ₦2.00 for mixed fishes of twenty in one set, the mean monthly gross income per fishing unit in the area is ₦2,321.61. The mean monthly gross income for the various LGAs, Bonny, Brass and Degema stood at ₦1,868.53, ₦3,320.89 and ₦1,775.42 respectively. The mean monthly gross revenue for a motorized fishing unit is ₦2,694.33, while non-motorized fishing unit realizes a gross revenue of ₦1,272.8. The difference is attributable to the wider scope of operation of the motorized canoe fishermen.

To obtain a fairly accurate estimate of fishermen's net income, the value of fish consumed by the fishermen and their crew, and other operational costs incurred in fishing were deducted from the total gross income.

Also, depreciation of capital assets - engines, canoes, gear was calculated using the straightline method and deducted. Following this line of thought, the estimated mean monthly net income per artisanal fishing unit in the study area is ₦1,175.60 with an operational and fixed total costs of ₦202.5 and ₦230 per month respectively (Table 2). This net revenue of ₦1,175.60 represents the return to management and capital including the value of fish consumed by fishermen and their crew.

## INVESTMENT POTENTIALS

The investment potentials for the artisanal fishing industry was derived by applying a model investment plan. The model obtains its data base from the cost-return analysis of the 3 LGAs in the study area. For easy application, the model has the following assumptions:

(i) Fishing unit under consideration is operated by a single individual or group of not less than 12 members.

(ii) Each unit has at least 6 motorized fishing canoes.

(iii) The principal gear in use is gillnet while the main fishes caught are bonga, sardines, croakers.

(iv) Fishing period is for about 4 - 6 monthsper year and 5 days per week.

(v) Average catch per fishing unit per trip is 200 fish cards and sold at ₦3.50 per card for bonga, ₦2.00 per card for sardine, and ₦4.00 for croakers and ₦2.00 for mixed fish of a set of twenty; and

(vi) Funds for the implementation of this model fishing unit is to be borrowed from a commercial bank. That is, a loan of ₦105,232.8 is to be raised at an annual interest of 9% to be repaid fully in 10 years with one year of grace.

The results of the cash flow analysis (Table 3) showed that the Internal Rate of Return (IRR) is greater than 50%, the Net Present Value (NPV) is ₦400,603.28 for the 10 years and a Benefit Cost Ratio (BCR) of 1 : 8. These results, especially the IRR indicates that the proposed investment would be high yielding. Also, the results showed a favourable output - input price relation. Consequently, capital invested is not tied up for long in building assets hence, substantial benefits begin to flow early in the life of the project and debt servicing is not onerous. In fact, Brown (1982) showed that projects with the above characteristics are indicative of projects with very high rate of return because the cash flow becomes positive quite early in the life of the project.

With an estimated NPV of ₦400,603.28 investment in artisanal fishing operations in the study area, one would enjoy a return to capital and management of about ₦40,060.3 per year and ₦3,338.4 per month if implemented by a single individual. However, if the project is operated by a group of fishermen, the return to each individual's capital and management would be ₦278,2 per month.

If this return is added to one's opportunity cost of labour, then the return to each individual for his labour, management and capital would be ₦481.2 per month.

When the results are subjected to a sensitivity analysis (Table 4), it was observed to be very responsive to a 10% change in cost. This implies that a drastic reduction of market price for fish or actual reduction of catch would adversely affect the rate of return and hence profitability.

## CONCLUSION

Traditionally, artisanal fishermen are often regarded as the poorest individuals in any society. In fact, Sagua (1976) and Mboma et al (1981) attributed the apathy of private investors to investment in fisheries projects to the low level of returns from fishing operations. Contrary to this view, the results of this study show that the mean monthly income of ₦1,186.90 for artisanal fishermen in this study area compares favourably with incomes of most white-collar jobs in the country.

Given the high rate of unemployment in the country, and the estimated high artisanal fishermen's annual income in the study area, fishing could be an attractive business with a high tendency of new comers. For this move to have any positive effect on the overall national economy, the right incentives must be provided and commercial banks should be encouraged to liberalize their loan policies. In addition, this anticipated mass movement to fishing would only be successful if the governments of the country would as a matter of urgency undertake a more comprehensive survey of the fisheries resources potentials of her coastal waters and come up with sound management strategies aimed at utilizing the resources more wisely.

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Table 1 - Mean monthly catches, investmet and operational costs and gross earnings for artisanal canoe fishermen in some selected Local Government Areas of the Rivers State.

| Selected LGAs | Mean monthly catches (kg) x 10 | Investment ₦ : K | Operational Cost ₦ : K | Gross Earnings ₦ : K | Proprietors Earnings ₦ : K | Canoe-men Earnings ₦ : K |
|---|---|---|---|---|---|---|
| Bonny LGA | 50.9 | 7135.44 | 639.78 | 1868.53 | 678.39 | 178.83 |
| Brass LGA | 59.0 | 7490.80 | 676.20 | 2320.90 | 1472.63 | 261.85 |
| Degema LGA | 39.5 | 5510.55 | 526.50 | 1775.42 | 662.68 | 165.85 |
| Total = | 144.4 | 23136.78 | 2142.48 | 6964.84 | 2813.64 | 606.53 |
| Mean = | 49.8 | 7712.26 | 714.16 | 2321.6 | 937.90 | 202.18 |

Table 2 - Estimated Mean monthly costs and returns for artisanal fisheries in some selected LGAs in the Rivers State

| Costs and Returns | ₦ : K |
|---|---|
| A. Fixed Costs | |
| Depreciation at 10% | |
| a) Canoe | 28.00 |
| b) Outboard engines | 84.00 |
| c) Fishing gear | 34.00 |
| d) Buildings and others | 84.00 |
| Total Fixed Costs (a + b + c + d) | ₦230.00 |
| B. Operational Costs | 600.50 |
| a) Fuel and Oil | 600.50 |
| b) Food on board | 113.00 |
| c) Canoe men's earnings | 202.50 |
| Total Operational Costs | 916.00 |
| Total Costs (A + B) | 1,146.00 |
| C. Gross Revenue | |
| a) Gross fish sales | 1,625.10 |
| b) Value of fish consumed by fishermen and crew | 696.50 |
| Total Gross Revenue ( a + b ) | 2,321.60 |
| D. Net Revenue (C - B) | 1,175.60 |

Table 3 - Projected cash flow for a model artisanal fishing unit (x 000₦)

| Sources and Use of Fund | Project Life (Years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1-2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ |
| 1. Cash Inflow | | | | | | | | | | |
| a) Revenue | | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 |
| b) Loan | 105.233 | - | - | - | - | - | - | - | - | - |
| | 105.233 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 | 139.2 |
| 2. Cash Outflow | | | | | | | | | | |
| A. Investment Costs | | | | | | | | | | |
| a) Buildings | 4.5 | - | - | - | - | - | - | - | - | - |
| b) Motorized Canoe | 5.0 | - | - | - | - | 5.0 | - | - | - | - |
| c) Fishing Gear | 10.0 | - | 10.0 | - | 10.0 | - | 10.0 | - | 10.0 | - |
| d) Outboard Engine | 18.0 | - | - | - | - | - | 18.0 | - | - | - |
| e) Miscellaneous | 2.4 | - | - | - | - | 2.4 | - | - | - | - |
| f) Contingency (5%) | 1.995 | - | 0.5 | - | 0.5 | - | 1.4 | - | 0.5 | - |
| Total Investment Costs | 41.895 | - | 10.5 | - | 10.5 | 7.4 | 29.4 | - | 10.5 | - |

Table 3 (Contd.)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| B. Operational Costs | | | | | | | | | | |
| a) Fuel and oil | - | 22.46 | 22.46 | 22.46 | 22.46 | 22.46 | 22.46 | 22.46 | 22.46 | 22.46 |
| b) Gear oil | - | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| c) Feed offshore | - | 3.64 | 3.64 | 3.64 | 3.64 | 3.64 | 3.64 | 3.64 | 3.64 | 3.64 |
| d) Electric bill | - | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| e) Labour cost | - | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 |
| f) Miscellaneous | - | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| g) Contingency (5%) | - | 3.012 | 3.012 | 3.012 | 3.012 | 3.012 | 3.012 | 3.012 | 3.012 | 3.012 |
| Total Operational Costs | - | 63.212 | 63.212 | 63.212 | 63.212 | 63.121 | 63.212 | 63.212 | 63.212 | 63.212 |
| Total Cash Outflow (A+B) | 41.895 | 63.212 | 73.712 | 63.212 | 73.712 | 70.612 | 92.612 | 63.212 | 73.712 | 63.212 |
| 3. Net Cash flow | | | | | | | | | | |
| 1 - 2 | 63.338 | 75.988 | 65.488 | 75.988 | 65.488 | 68.588 | 46.588 | 75.988 | 65.488. | 75.988 |
| 4. Loan Repayment | | | | | | | | | | |
| Principal | - | 27.05 | 27.05 | 27.05 | 27.05 | - | - | - | - | - |
| Interest | - | 2.43 | 2.43 | 2.43 | 2.43 | - | - | - | - | - |
| Total | - | 29.48 | 29.48 | 29.48 | 29.48 | - | - | - | - | - |
| 5. Net Balance | 46.47 | 35.97 | 46.47 | 35.97 | 66 16 | 43.55 | 75.95 | 75.95 | 65.45 | 73.55 |

Table 4 - Sensitivity analysis

| Viability Indicators | Value at 10% Increase Costs | Value at 10% Decrease in Revenue |
|---|---|---|
| IRR | 50% | 50% |
| NPV | 352993.91 | 312782.3 |
| BCR | 1.65 | 1.63 |